



Aptar Pharma Announces Collaboration with TFF Pharmaceuticals to Develop Intranasal Delivery of Dry Powder Vaccines and Therapeutics

A shelf-stable dry powder vaccine formulation delivered intranasally could dramatically change the existing vaccine landscape

Crystal Lake, Illinois, November 7, 2022 – Aptar Pharma, a global leader in drug delivery and active material science solutions and services, today announced a collaboration with TFF Pharmaceuticals, Inc., a clinical-stage biopharmaceutical company focused on developing and commercializing innovative drug products based on its patented Thin Film Freezing technology platform. The collaboration is aimed at developing and testing the administration of dry powder vaccines utilizing TFF Pharmaceutical’s Thin Film Freezing technology and Aptar Pharma’s proprietary intranasal Unidose (UDS) Powder Nasal Spray System.

TFF Pharmaceutical’s Thin Film Freezing technology platform has broad applicability to convert drugs (small and large molecules) and vaccines into a dry powder formulation for local administration.

A need for alternative routes of vaccination, such as intranasal, was highlighted at the White House Summit on the Future of COVID-19 Vaccines, which took place in July 2022. The development of an effective intranasal vaccine has numerous potential advantages over conventional, subcutaneous or intramuscular-based delivery. First, the nasal passageway is very often the first point of entry for certain pathogens; if the pathogen can be halted in the nasal passages, curtailing the spread of infection further, this could lead to an improved overall prognosis. In addition, the direct immunization of nasal mucosa may promote systemic and mucosal immunity, which may help prevent viral shedding and disease transmission.

Furthermore, self-administration of a nasal powder vaccine provides for “needle free” administration to the patient avoids the need for syringe disposal, and potentially simplifies global distribution with the elimination of extreme cold from the supply chain. These aspects of nasal delivery could open up vaccine availability to larger populations in regions and countries with limited refrigeration infrastructure.



During the Vaccines Summit-2022, which took place from October 11 to 13, 2022, in Washington, DC, Aptar Pharma presented research findings from their collaboration with TFF Pharmaceuticals. The presentation highlighted data related to nasal deposition of a dry powder vaccine, physical characteristics of the administered formulation, the integrity and activity testing of the dry powder vaccine after administration, and the emitted particle size. The amount of dry powder delivered to the targeted region of the nasal cavity was also presented. Aptar Pharma will present additional data on these efforts at the World Vaccine & Immunotherapy Congress, which will be held in San Diego, CA, from November 28 to December 1, 2022.

“We are very excited to partner with Aptar Pharma to test our Thin Film Freezing formulation with their unique intranasal device,” said Glenn Mattes, President & CEO of TFF Pharmaceuticals. “By combining our collective and proprietary expertise in drug development, device engineering and formulation technologies, we believe this collaboration has the potential to create ground-breaking advancements in the field of drug delivery. Intranasal dry powder vaccines could be a true game changer for people around the world.”

“The nasal vaccine formulation developed using TFF Pharmaceutical’s technology combines the antigen and adjuvant into one ready-to-use device,” commented Dr. Julie D. Suman, Vice President, Scientific Affairs at Aptar Pharma. “This eliminates the need for combining separate vials, which potentially saves time, reduces human error and medical waste.”

The results of the feasibility testing will be published by Aptar Pharma, The University of Texas at Austin (UT) and TFF Pharmaceuticals in the coming months. Aptar, UT and TFF have summarized the results of the initial intranasal vaccine feasibility testing in a [pre-print publication](#), to be followed by a peer-reviewed publication in the coming months.

About Aptar Pharma

Aptar Pharma is part of AptarGroup, Inc., a global leader in the design and manufacturing of a broad range of drug delivery, consumer product dispensing and active material science solutions and services. Aptar’s innovative solutions and services serve a variety of end markets including pharmaceutical, beauty, personal care, home care, food and beverage. Using insights, proprietary design, engineering and science to create dispensing, dosing and



protective technologies for many of the world's leading brands, Aptar in turn makes a meaningful difference in the lives, looks, health and homes of millions of patients and consumers around the world. Aptar is headquartered in Crystal Lake, Illinois and has 13,000 dedicated employees in 20 countries. For more information, visit www.aptar.com.

About TFF Pharmaceuticals

TFF Pharmaceuticals, Inc. (NASDAQ: TFFP) is a clinical-stage biopharmaceutical company engaging patented rapid freezing technology to develop and transform medicines into potent dry powder formulations for better efficacy, safety, and stability. The company's versatile Thin Film Freezing (TFF) technology platform has broad applicability to convert most any drug, including vaccines, small and large molecules, and biologics, into an elegant dry powder highly advantageous for inhalation, with improved absorption so drugs can also be delivered to the eyes, nose and topically to the skin. To learn more about TFF Pharmaceuticals and its product candidates, visit www.tffpharma.com.

#

Media Contact:

Ciara Jackson
Aptar Pharma
+49 151 1951 6502
ciara.jackson@aptar.com